J. Chem. & Cheml. Sci. Vol.1 (2), 125-129 (2011)

Screening for the Anti-Bacterial Efficiency of *Cassia Fistula Linn*

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ABSTRACT

Hexane, chloroform, ethyl acetate, ether and methanol extracts from the flower and pods of *Cassia fistula* (an ethnomedicinal plant) were tested against bacteria. The antimicrobial sensitivity of plant extracts was observed using the well diffusion method by measuring the diameter of the growth inhibition zone. Ethyl acetate crude extract was fractionated using chromatographic techniques. The ethyl acetate and ether extracts of dried flowers and pods of *Cassia Fistula* investigated individually for *invitro* antibacterial activity by well diffusion method against *Escheria coli, Salmonella typhi, Shigella dysenteriae, Bacillus cereus* and *Psudomonas aeruginosa*.

Key Words : *Cassia Fistula,* antibacterial, flower and pod extracts.

INTRODUCTION

Various medicinal plants have been used for years in daily life to treat diseases all over the world. Interest in medicinal plants reflects the recognition of the validity of many traditional claims regarding the value of natural products in healthcare (Nair *et al.*, 2005). *Cassia fistula* L., (Legumi-nosae), a semi-wild Indian Labernum (also known as the Golden Shower), is distributed in various countries including Asia, South Africa, Mexico, China, West Indies, East Africa and Brazil. It is an ornamental tree with beautiful bunches of yellow flowers.

Plants are known to contain innumerable biologically active compounds (Perumal Samy *et.al*., 1999). Plants may offer a new source of antimicrobial agents for use and they produce great deal of secondary metabolites, many of them with antibacterial activities. Indian people are using the leaves to treat inflammation, the flowers as a purgative, the fruit as anti-inflammatory, antipyretic, abortifacient, demulcent, purgative, refrigerant, the plant is good for chest complaints, eye ailments, flu, heart and liver ailments and rheumatism. It is useful in treating haematemesis, pruritus, eucoderma and diabetes (Alam *et al*., 1990; Asolkar *et al.*, 1992). Antimicrobial activity of *Cassia fistula* leaves, stem bark, and pods was carried out against 14 pathogenic bacteria and 6 fungi at 400 µg/disc (Abbas

Ali *et al*., 2004). Perumal Samy *et al.* (1998) have reported that *Cassia fistula* leaf extracts showed antibacterial activity against a wide spectrum of bacteria such as *Escherichiacoli, Klebsiella aerogenes, Pseudomonas aeruginosa* and *Proteus vulgaris*. Antibacterial activity of different solvent extracts of *Cassia fistula* flower against *Bacillus subtilis, Staphylococcus aureus,Staphylococcus epidermis, Entero-coccus faecalis, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, Protius vulgaris, Erwinia* and *Cndida albicans* was also reported by Duraipandiyan and Ignacimuthu(2007).

In this present work , the screening of flower and pod extract of *Cassia fistula* against pathogenic bacteria was carried out in order to detect new sources of antimicrobial agents. In this paper, the antibacterial activity of different solvent extract of *Cassia fistula* flower and pods against *Escheria coli*, *Salmonella typhi, Shigella dysenteriae, Bacillus cereus* and *Psudomonas aeruginosa*. was first reported.

MATERIALS AND METHODS

Plant Material

The plant materials used for the study were collected from the wild population around Mayiladuthurai taluk, Nagapattinam Dt, Tamilnadu ,India. The flowers and pods were dried in shade and dried flowers and pods were subjected to pulverization to get coarse powder.

Extraction and isolation

The coarse powder material was subjected to soxhlet extraction separately and successively with ethanol and distilled water. These extracts were concentrated to dryness in flash evaporator under reduced pressure and controlled temperature. The extracts were re-suspended into bottom and top. A portion of chloroform extract (20 g) was subjected to column chromatography over silica gel (100–200 mesh) The column was first eluted with hexane followed by chloroform ,ethyl acetate isopropanol and finally with methanol in an increasing polarity order which gave 54 fractions. Fractions from 30-33 were chromatographed on silica geland eluted with chloroform: ethyl acetate (50:50)ratio.

Bacteria test and Culture Media

The bacterial strains such as *Escheria coli, Salmonella typhi, Shigella dysenteriae, Bacillus cereus* and *Psudomonas aeruginosa* were purchased from IMTECH Chandigarh.

The media used for anti bacterial test were Muller Hinton agar from Himedia private Ltd. Mumbai. India

Antibacterial testing

The test bacteria were inoculated into liquid medium (Nutrient broth) and incubated at 37^{o}C for 8-10hrs and the suspension were checked to provide approximately 5-7 CFI (M).The plant extracts were tested for anti bacterial activity by the well diffusion method (Chung *et.al.*, 1990) using bacterial strains such as *Escheria coli, Salmonella typhi, Shigella dysenteriae, Bacillus cereus* and *Psudomonas aeruginosa*. A culture of respective strains poured over the base plant containing 10 ml of muller Hinton agar in sterile 9 cm Petri dishes and spread over agar plates using sterile glass L-rod each

extract was poured onto the well. Each extract was tested in triplicate and the plants were incubated at 37°C for 24 hrs, where after inhibition zones were recovered Antibacterial activity was expressed the ratio of the inhibition zone produced by the plant extracts.

RESULTS AND DISCUSSION

The antimicrobial sensitivity of plant extracts was observed using the well diffusion method by measuring the diameter of the growth inhibition zone. The results are given in Table 1 and the photograph of growth inhibition zone in mm is shown in figure 1. The S_1 sample showed high degree flavor , *Shigella dysenteriae, Bacillus cereus* . After that, it can showed high degree of inhibition against *Escheria coli* and *Psudomonas aeruginosa.* These observations suggest that the organic solvent extraction method is better for the isolation of anti bacterial compounds. Similar findings and conclusions were drawn by Krishna *et.al.,* (1997) and Singh & Singh (2000) in their experiment which represent a very good mechanism of biological control of micro organisms.

In addition the effectiveness of plant was not due to one main active constituent, but to the combined action of other chemical compounds involved in it (Bai 1990) some examples include alkaloids, flavanoids, tri-terpenoids thymol and other compounds of phenolic nature which are classified as antimicrobial compounds (Rojas *et. al.,* 1992). The present study showed the efficiency of anti microbial activity exclusively for bacterial pathogens which really shows the presence of biological principles. These results are consistent with previous reports on related plants regarding "Gram-positive" bacteria (Cowan, 1999). The antibacterial activity of different solvent extract of *Cassia fistula* flower and pods against *Escheria coli*, *Salmonella typhi, Shigella dysenteriae, Bacillus cereus* and *Psudomonas aeruginosa*. assessed by the present work, authenticates its use in traditional medicine for the treatment of skin infection, fever and diarrhea. This plant may be a source of drugs that could improve the treatment of bacterial infections .Further work is in progress for the isolation of the active principle of the plant extract responsible for antibacterial activity.

Table – 1 *Invitro* Anti bacterial activity of *Cassia fistula linn*

Test Organism	S_1	S_2	S_3
	Zone of inhibition in mm		
1. *Escheria coli*	21	19	10
2. *Salmonella typhi*	20	18	9
3. *Shigella dysenteriae*	22	19	10
4. *Bacillus cereus*	23	19	10
5. *Psudomonas aeruginosa*	21	18	8

S_1 = The ethyl acetate fraction obtained as bottom during separation.

S_2 = The ethyl acetate fraction obtained as top during separation.

S_3 = The ether fraction obtained as top during separation.

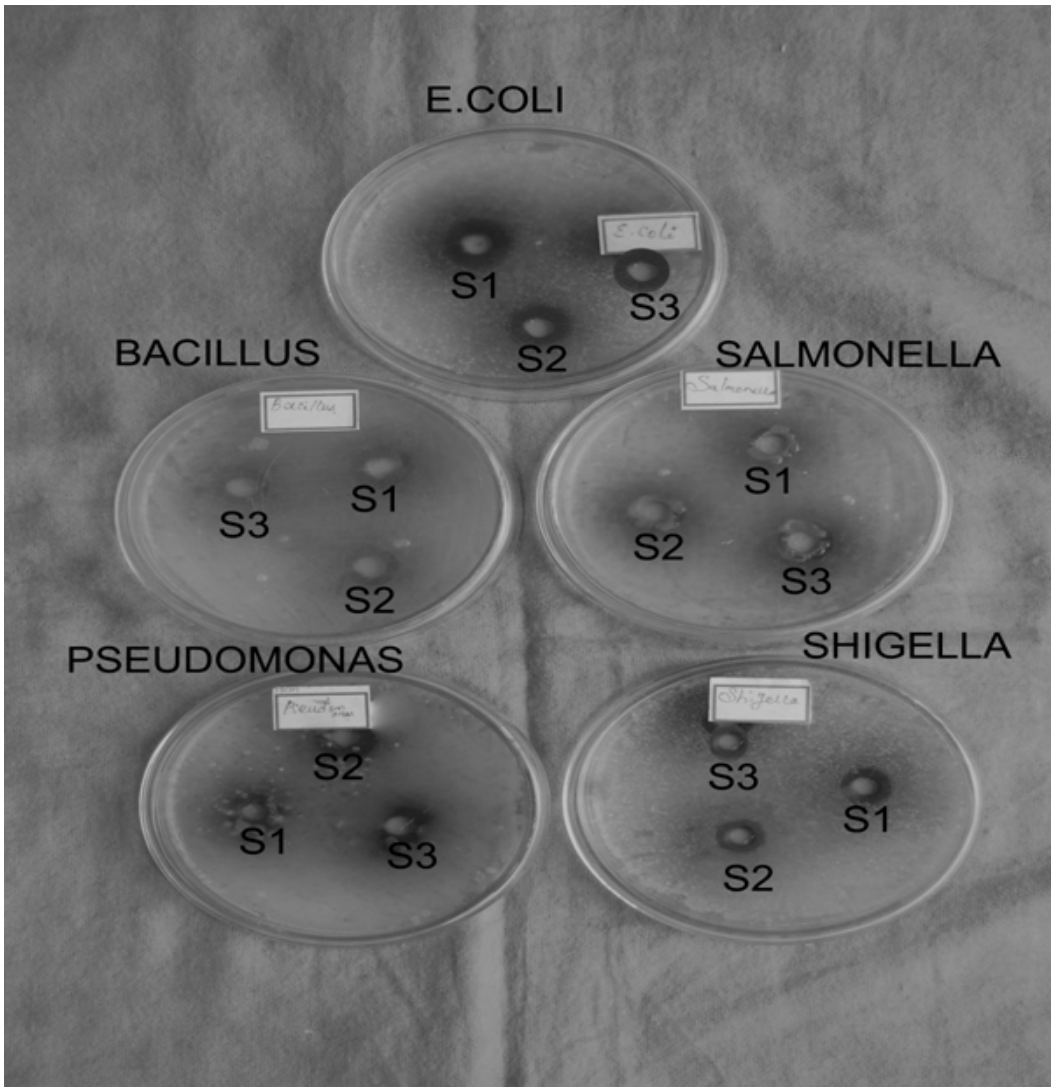

Figure-1. *Invitro* Anti bacterial activity of *Cassia fistula linn*- the photograph of growth inhibition zone in mm

ACKNOWLEDGEMENT

The author **Dr. P. Anbu Srinivasan** acknowledges the University Grants Commission, South Eastern Regional Office, Hyderabad, for the financial support under the scheme of Minor Research Project.

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